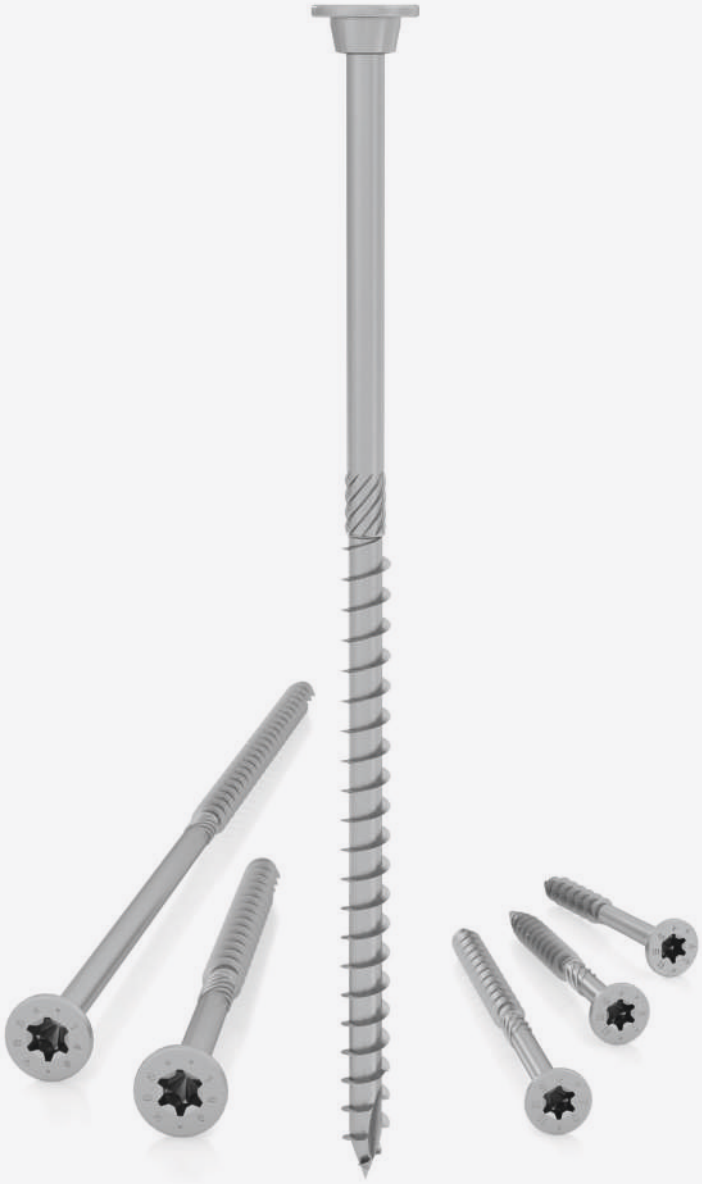
HBS+ evo

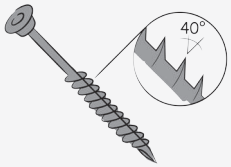
Exterior screws, pan head

Carbon steel with revodip coating



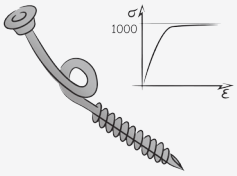
SPECIAL THREADING

Longer length (60%) asymmetric "umbrella" thread



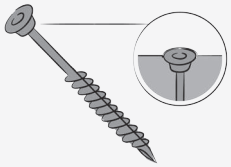
SPECIAL STEEL

Highly ductile (moves with the wood) and resistant steel ($f_{y,k}$ = 1000 N/mm^2)



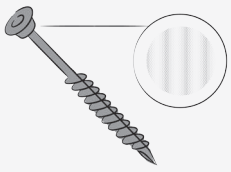
PAN HEAD

Guarantees an excellent surface finish and the possibility of usage on steel plates with circular holes



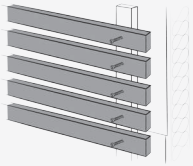
REVODIP COATING

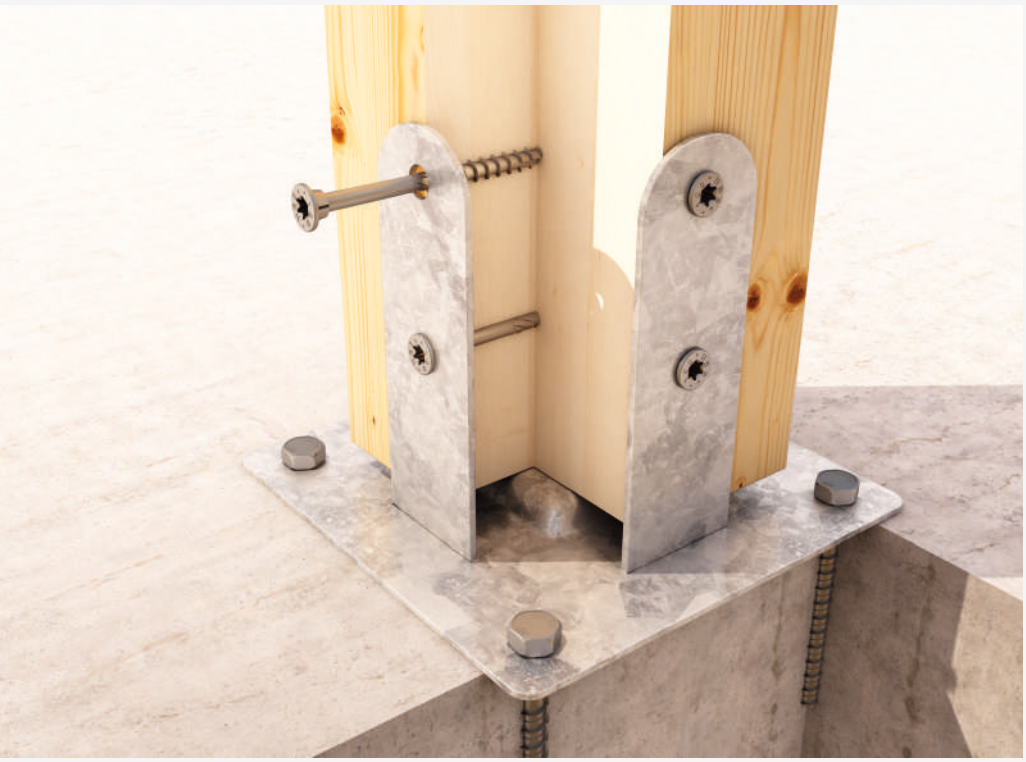
Surface treatment with high corrosion resistance, comparable to class C5



FIELDS OF USE

Exterior use; appropriate for service classes 1-2-3





AESTHETICS

The pan head with flat under head compresses the fibres at the end of the joint, guaranteeing a perfect aesthetic finish

STATIC SAFETY

The special high resistance steel guarantees the possibility of safe joints with high static performance under all service conditions (service classes 1-2-3)

STEEL – WOOD

Ideal for use on steel plates with circular holes and hence for exterior fastening systems in service class 3 (pillar bases)

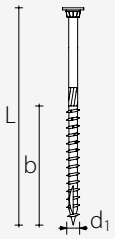
Applications

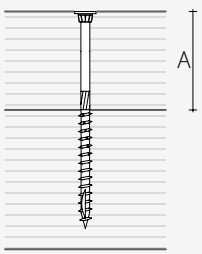
Sleeve pillar-base fastening in stainless steel

Adjustable pillar-base fastening in stainless steel with dacromet coating

Fastening of diagonal element to an exterior pergola

Codes and dimensions

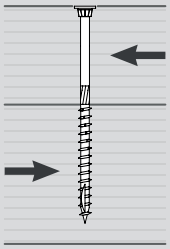




d_1 [mm]	code		L [mm]	b [mm]	A [mm]	pcs/pckg
5 *TX25*	**HBSP550C**		50	30	20	200
	HBSP560C		60	35	25	
	HBSP570C		70	40	30	100
	HBSP580C		80	50	30	
6 *TX30*	**HBSP680C**		80	50	30	100
	HBSP690C		90	55	35	
	HBSP6100C		100	60	40	
	HBSP6120C		120	75	45	
	HBSP6140C		140	80	60	
	HBSP6160C		160	90	70	
	HBSP6180C		180	100	80	
	HBSP6200C		200	100	100	
8 *TX40*	**HBSP840C**		40	32	10	100
	HBSP860C		60	52	20	
	HBSP880C		80	52	30	
	HBSP8100C	new	100	60	40	
	HBSP8120C	new	120	80	50	
	HBSP8160C	new	160	90	70	
	HBSP8200C	new	200	100	100	
10 *TX40*	**HBSP1060C**	new	60	52	10	50
	HBSP1080C	new	80	60	20	
	HBSP10100C	new	100	80	30	

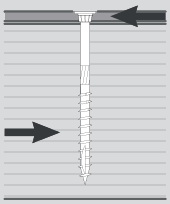
Carpenter statics

SHEAR V_{adm}



WOOD-WOOD

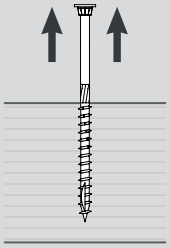
d_1 [mm]	L [mm]	V_{adm}
5	≥ 60	43 kg
6	≥ 80	61 kg
8	≥ 80	96 kg
10	≥ 100	120 kg



STEEL-WOOD

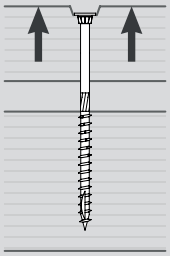
d_1 [mm]	L [mm]	V_{adm}
5	≥ 50	53 kg
6	≥ 80	77 kg
8	≥ 40	136 kg
10	≥ 60	213 kg

THREAD WITHDRAWAL N_{adm}



	Length L [mm]											
d_1 [mm]	**40**	**50**	**60**	**70**	**80**	**90**	**100**	**120**	**140**	**160**	**180**	**200**
5	-	75 kg	88 kg	100 kg	125 kg	-	-	-	-	-	-	-
6	-	-	-	-	150 kg	165 kg	180 kg	225 kg	240 kg	270 kg	300 kg	300 kg
8	128 kg	-	208 kg	-	208 kg	-	240 kg	320 kg	-	360 kg	-	400 kg
10	-	-	260 kg	-	300 kg	-	400 kg	-	-	-	-	-

HEAD PENETRATION N_{adm}



d_1 [mm]	N_{adm}
5	47 kg
6	72 kg
8	105 kg
10	150 kg

CALCULATION FORMULAS - SHEAR DIN 1052-2:1988

WOOD-WOOD

$V_{adm} = \min \{ 0,4 \cdot A \cdot d_1; 1,7 \cdot d_1^{\,2} \}$

d_1 [mm]
A [mm]
V_{adm} [kg]

STEEL-WOOD

$V_{adm} = 1,25 \cdot 1,7\, d_1^{\,2}$

STEEL-WOOD EXAMPLE

HBS+ evo 8 x 60 mm

$d_1 = 8$ mm

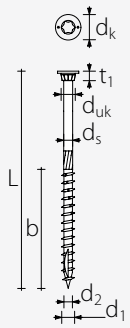
$V_{adm} = 1,25 \cdot 1,7 \cdot d_1^2$
$V_{adm} = 1,25 \cdot 1,7 \cdot 8^2 = 136$ kg

NOTE

- Allowable values in accordance with DIN 1052:1988.
- The allowable extraction values are calculated considering the threaded part as being completely inserted into the wood.

Geometry and minimum distances

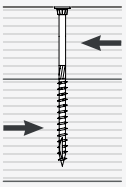
GEOMETRY AND MECHANICAL CHARACTERISTICS



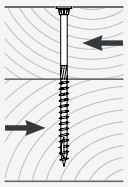
SCREW HBS+ evo					
Nominal diameter	**d_1 [mm]**	**5**	**6**	**8**	**10**
Head diameter	d_k [mm]	9,65	12,00	14,50	18,25
Tip diameter	d_2 [mm]	3,40	3,95	5,40	6,40
Shank diameter	d_s [mm]	3,65	4,30	5,80	7,00
Head thickness	t_1 [mm]	5,60	6,50	6,80	7,00
Underhead diameter	d_{UK} [mm]	6,00	8,00	10,00	12,00
Pre-bored hole diameter	d_V [mm]	3,0	4,0	5,0	6,0
Characteristic yield moment	$M_{y,k}$ [Nmm]	5417,2	9493,7	20057,5	35829,6
Characteristic extraction-resistance parameter	$f_{ax,k}$ [N/mm^2]	11,7	11,7	11,7	11,7
Characteristic head-penetration parameter	$f_{head,k}$ [N/mm^2]	10,5	10,5	10,5	10,5
Characteristic tensile strength	$f_{tens,k}$ [kN]	7,9	11,3	20,1	31,4

MINIMUM DISTANCES FOR SHEAR LOADS

	α = 0°				α = 90°			
SCREWS INSERTED WITH PRE-BORED HOLES (1)								
	5	**6**	**8**	**10**	**5**	**6**	**8**	**10**
a_1 [mm]	25	30	40	50	20	24	32	40
a_2 [mm]	15	18	24	30	20	24	32	40
$a_{3,t}$ [mm]	60	72	96	120	35	42	56	70
$a_{3,c}$ [mm]	35	42	56	70	35	42	56	70
$a_{4,t}$ [mm]	15	18	24	30	35	42	56	70
$a_{4,c}$ [mm]	15	18	24	30	15	18	24	30



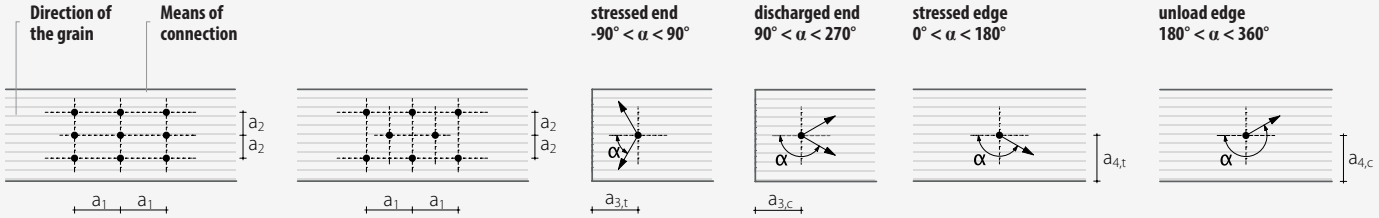
Angle between strength and grain α = 0°



Angle between strength and grain α = 90°

CHARACTERISTIC DENSITY: $\rho_k \leq 420$ kg/m^3								
	α = 0°				α = 90°			
SCREWS INSERTED WITHOUT PRE-BORED HOLES (2)								
	5	**6**	**8**	**10**	**5**	**6**	**8**	**10**
a_1 [mm]	60	72	96	120	25	30	40	50
a_2 [mm]	25	30	40	50	25	30	40	50
$a_{3,t}$ [mm]	75	90	120	150	50	60	80	100
$a_{3,c}$ [mm]	50	60	80	100	50	60	80	100
$a_{4,t}$ [mm]	25	30	40	50	50	60	80	100
$a_{4,c}$ [mm]	25	30	40	50	25	30	40	50

CHARACTERISTIC DENSITY: $420 \leq \rho_k \leq 500$ kg/m^3								
	α = 0°				α = 90°			
SCREWS INSERTED WITHOUT PRE-BORED HOLES (3)								
	5	**6**	**8**	**10**	**5**	**6**	**8**	**10**
a_1 [mm]	75	90	120	150	35	42	56	70
a_2 [mm]	35	42	56	70	35	42	56	70
$a_{3,t}$ [mm]	100	120	160	200	75	90	120	150
$a_{3,c}$ [mm]	75	90	120	150	75	90	120	150
$a_{4,t}$ [mm]	35	42	56	70	60	72	96	120
$a_{4,c}$ [mm]	35	42	56	70	35	42	56	70



NOTE

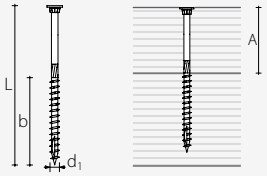
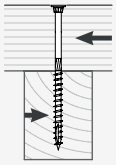
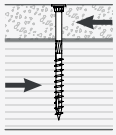
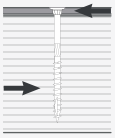
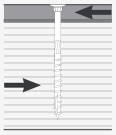
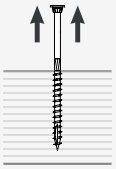
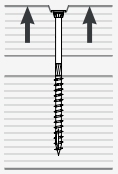
(1) The minimum distances comply with the EN 1995:2008 standard, in accordance with ETA-11/0030.

(2) The minimum distances comply with EN 1995:2008, according to ETA-11/0030, considering a mass density of the wood elements of $\rho_k \leq 420$ kg/m^3.

(3) The minimum distances comply with EN 1995:2008, according to ETA-11/0030, considering a mass density of the wood elements of $420 \leq \rho_k \leq 500$ kg/m^3.

- In the case of OSB-wood joints, the minimum spacings (a_1, a_2) can be multiplied by a coefficient of 0.85.
- In the case of steel-wood joints, the minimum spacings (a_1, a_2) can be multiplied by a coefficient of 0.7.
- In the case of Douglas fir elements (Pseudotsuga menziesii), the minimum distances parallel to the grain (a_1 , $a_{3,t}$, $a_{3,c}$) must be multiplied by a coefficient of 1.5.

Designer statics

				SHEAR						TRACTION	
geometry				wood-wood	panel-wood (1)		thin steel-wood plate (2)		thick steel-wood plate (3)	thread withdrawal (4)	head penetration (5)
											
d_1 [mm]	L [mm]	b [mm]	A [mm]	$R_{V,k}$ [kN]	$R_{V,k}$ [kN]		$R_{V,k}$ [kN]		$R_{V,k}$ [kN]	$R_{ax,k}$ [kN]	$R_{head,k}$ [kN]
5	50	30	20	1,29	S_{PAN} = 15 mm	1,21	$S_{PLATE} \leq 2,5$ mm	1,74	$S_{PLATE} \geq 5,0$ mm	2,25	2,03	1,13
	60	35	25	1,43		1,21		1,83		2,34	2,37	1,13
	70	40	30	1,52		1,21		1,91		2,42	2,71	1,13
	80	50	30	1,52		1,21		2,08		2,59	3,38	1,13
6	80	50	30	2,02	S_{PAN} = 15 mm	1,57	$S_{PLATE} \leq 3,0$ mm	2,76	$S_{PLATE} \geq 6,0$ mm	3,48	4,06	1,75
	90	55	35	2,18		1,57		2,86		3,58	4,47	1,75
	100	60	40	2,18		1,57		2,96		3,68	4,87	1,75
	120	75	45	2,18		1,57		3,26		3,99	6,09	1,75
	140	80	60	2,18		1,57		3,37		4,09	6,50	1,75
	160	90	70	2,18		1,57		3,48		4,29	7,31	1,75
	180	100	80	2,18		1,57		3,48		4,49	8,12	1,75
	200	100	100	2,18		1,57		3,48		4,49	8,12	1,75
8	40	32	10	1,48	$S_{PAN} \geq 15$ mm	1,77	$S_{PLATE} \leq 4,0$ mm	2,13	$S_{PLATE} \geq 8,0$ mm	3,66	3,47	2,55
	60	52	20	2,54		2,32		3,31		5,12	5,63	2,55
	80	52	30	2,83		2,32		4,21		5,37	5,63	2,55
	100	60	40	3,20		2,32		4,42		5,58	6,50	2,55
	120	80	50	3,44		2,32		4,96		6,12	8,66	2,55
	160	90	70	3,44		2,32		5,24		6,39	9,75	2,55
	200	100	100	3,44		2,32		5,51		6,67	10,83	2,55
10	60	52	10	1,73	$S_{PAN} \geq 15$ mm	2,55	$S_{PLATE} \leq 5,0$ mm	3,80	$S_{PLATE} \geq 10,0$ mm	6,31	7,04	4,05
	80	60	20	3,45		2,55		5,18		7,74	8,12	4,05
	100	80	30	3,91		2,55		6,56		8,43	10,83	4,05

GENERAL PRINCIPLES

- Characteristic values comply with the EN 1995:2008 standard in accordance with ETA-11/0030.
- Design values are obtained from the following characteristic values:

$$R_d = \frac{R_k \cdot k_{mod}}{\gamma_m}$$

The coefficients γ_m and k_{mod} should be taken according to the current regulations used for the calculation.
- For the mechanical resistance values and the geometry of the screws, reference was made to ETA-11/0030.
- In the calculations, the density of the wood elements was considered equal to $\rho_k = 420$ kg/m³.
- Values were calculated considering the threaded part as being completely inserted into the wood.
- Sizing and verification of the wooden elements, panels and steel plates must be done separately.
- The shear characteristic resistances are calculated for screws inserted without pre-bored holes. In the case of screws inserted with pre-bored holes, greater resistance values can be obtained.
- For different calculation methods, the myProject software is available free of charge (www.rothoblaas.com).

NOTE

(1) The shear characteristic resistances are calculated considering an OSB panel or particle board with a S_{PAN} thickness.

(2) The shear resistance characteristics are calculated considering the case of a thin plate ($S_{PLATE} \leq 0.5\ d_1$).

(3) The shear resistance characteristics are calculated considering the case of a thick plate ($S_{PLATE} \geq d_1$).

(4) The axial thread-extraction resistance was calculated considering a 90° angle between the grain and the connector and for a fixing length of b.

(5) The axial resistance to head penetration was calculated using wood elements. In the case of steel-wood connections, generally the steel tensile strength is binding with respect to head separation or penetration.